

WHAT IS CLAIMED IS

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1. An imaging optical system for imaging a one-dimensional image on an image surface by regarding as an object a light modulator element which has light modulator parts arranged one-dimensionally in a first direction, and regarding a bundle of rays from the light modulator element as an object light, comprising:

10 at least two anamorphic surfaces each having radii of curvature which are different on an object surface in the first direction and a second direction which is 15 perpendicular to the first direction, so that imaging surfaces in the first and second directions match.

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2. The imaging optical system as claimed in claim 1, wherein at least one of said at least two anamorphic surfaces has a bent axis toroidal surface with a non-arcuate shape within a cross section cut 25 along the first direction, and a curvature center line

of the bent axis toroidal surface formed by joining centers of curvature of cross sections cut along the second direction is a curve.

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3. The imaging optical system as claimed in claim 1, wherein at least one of said at least two 10 anamorphic surfaces has a first non-arcuate shape within a cross section cut along the first direction, and a second non-arcuate shape within a cross section cut along the second direction, and said second non-arcuate shape is variable depending on a coordinate of thereof 15 in the first direction.

20 4. The imaging optical system as claimed in claim 1, wherein an imaging magnification M_v in the first direction and an imaging magnification M_h in the second direction satisfy a relationship $|M_v/M_h| > 1$.

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5. The imaging optical system as claimed in
claim 4, wherein a principal point in the first
direction is set at a position closer to the light
modulator element than that of a principal point in the
5 second direction, through the entire imaging optical
system.

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6. The imaging optical system as claimed in
claim 1, which is approximately telecentric in the first
direction on a side closer to the light modulator
element.

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7. The imaging optical system as claimed in
20 claim 1, comprising:

a stopper arranged closer to the imaging surface
than the light modulator element.

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8. The imaging optical system as claimed in
claim 1, comprising:

an imaging system formed by a plurality of lenses,
wherein at least two of the plurality of lenses
5 have different focal distances in the first and second
directions, focal distances which differ in the first
and second directions for the entire imaging optical
system, and different imaging magnifications on the
image surface.

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9. The imaging optical system as claimed in
15 claim 8, wherein at least one of the plurality of lenses
arranged closer to the imaging surface than the light
modulator element has a power P_{iv} in the first direction
and a power P_{ih} in the second direction which satisfy a
relationship $P_{iv} < P_{ih}$, and at least one of the
20 plurality of lenses arranged closer to the light
modulator element than the imaging surface has a power
 P_{ov} in the first direction and a power P_{oh} in the second
direction which satisfy a relationship $P_{ov} > P_{oh}$.

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10. An image display apparatus comprising:
a light modulator element which has light modulator
parts arranged one-dimensionally in a first direction;
an imaging optical system to image a one-
5 dimensional image on an image surface by regarding said
light modulator element as an object and regarding a
bundle of rays from the light modulator element as an
object light, said imaging optical system including at
least two anamorphic surfaces each having radii of
10 curvature which are different on an object surface in
the first direction and a second direction which is
perpendicular to the first direction, so that imaging
surfaces in the first and second directions match; and
a display section to display an image on a display
15 surface by imaging the one-dimensional image on the
display surface via said imaging optical system and
relatively scanning the one-dimensional image and the
display surface in a direction perpendicular to a
longitudinal direction of the one-dimensional image.

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11. The image display apparatus as claimed in
25 claim 10, wherein said light modulator element

comprises:

a first modulator element having light modulator parts with spectral characteristics for red (R) color and arranged one-dimensionally in the first direction;

5 a second modulator element having light modulator parts with spectral characteristics for green (G) color and arranged one-dimensionally in the first direction; and

a third modulator element having light modulator parts with spectral characteristics for blue (B) color and arranged one-dimensionally in the first direction, said first, second and third modulator elements being arranged parallel to each other so that each of the first, second and third modulator elements is 15 adjacent to at least one of the first, second and third modulator elements.

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12. The image display apparatus as claimed in claim 11, wherein said display section overlaps the red (R), green (G) and blue (B) colors with a timing difference to perform a color composite on the same 25 pixel imaging position when relatively scanning the one-

dimensional image and the display surface.

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13. The image display apparatus as claimed in
claim 10, wherein said display section comprises:

a deflecting section to deflect an imaged bundle of
rays obtained via said imaging optical system, so as to
10 scan the one-dimensional image with respect to the
display surface which is planar; and

15 a curvature of field correcting optical system,
disposed between the deflecting section and the display
surface, to substantially match an image surface of the
imaged bundle of rays deflected and scanned by the
deflecting section to the display surface.

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14. An imaging optical apparatus comprising:
a light modulator element comprising a first
modulator element having light modulator parts with
spectral characteristics for red (R) color and arranged
25 one-dimensionally in a first direction, a second

modulator element having light modulator parts with
spectral characteristics for green (G) color and
arranged one-dimensionally in the first direction, and a
third modulator element having light modulator parts
5 with spectral characteristics for blue (B) color and
arranged one-dimensionally in the first direction, said
first, second and third modulator elements being
arranged parallel to each other so that each of the
first, second and third modulator elements is adjacent
10 to at least one of the first, second and third modulator
elements; and

an imaging optical system to image lights from the
first, second and third modulator elements of said light
modulator element one-dimensionally on a common display
15 surface,

a length of an imaging optical path for at least
one of the colors being different from those of imaging
optical paths for the other two colors, so as to correct
differences in magnifications in a direction
20 corresponding to the first direction caused by color
aberration.

15. The imaging optical apparatus as claimed
in claim 14, wherein a physical distance of at least one
of the first, second and third modulator elements from
said imaging optical system along an optical axis of
5 said imaging optical system is different from those of
the other two modulator elements.

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16. The imaging optical apparatus as claimed
in claim 14, wherein:
the modulator parts of each of the first, second
and third modulator elements are arranged on the same
15 plane so that physical distances of the first, second
and third modulator elements from said imaging optical
system along an optical axis of said imaging optical
system are approximately the same, and
said imaging optical apparatus comprising:
20 a first transparent plate disposed adjacent to and
parallel to the first modulator element;
a second transparent plate disposed adjacent to and
parallel to the second modulator element; and
a third transparent plate disposed adjacent to and
25 parallel to the third modulator element,

one of the first, second and third transparent plates having a thickness different from those of the other two transparent plates, so as to mutually correct lengths of imaging optical paths respectively through
5 the first, second and third transparent plates.

10 17. The imaging optical apparatus as claimed in claim 14, wherein lengths of imaging optical paths with respect to the second and third modulator elements are approximately the same, and a length of an imaging optical path with respect to the first modulator element
15 is longer than the lengths of the imaging optical paths with respect to the second and third modulator elements.

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18. The imaging optical apparatus as claimed in claim 14, wherein the second modulator element is disposed adjacent to an optical axis of said imaging optical system, and the first and third modulator
25 elements are disposed to sandwich the second modulator

element in a second direction perpendicular to the first direction.

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19. An image display apparatus comprising:
a light modulator element comprising a first
modulator element having light modulator parts with
10 spectral characteristics for red (R) color and arranged
one-dimensionally in a first direction, a second
modulator element having light modulator parts with
spectral characteristics for green (G) color and
arranged one-dimensionally in the first direction, and a
15 third modulator element having light modulator parts
with spectral characteristics for blue (B) color and
arranged one-dimensionally in the first direction, said
first, second and third modulator elements being
arranged parallel to each other so that each of the
20 first, second and third modulator elements is adjacent
to at least one of the first, second and third modulator
elements;
an imaging optical system to image lights from the
first, second and third modulator elements of said light
25 modulator element one-dimensionally on an image surface;

and

a display section to display an image on a display surface by imaging the one-dimensional image on the display surface via said imaging optical system and 5 relatively scanning the one-dimensional image and the display surface in a direction perpendicular to a longitudinal direction of the one-dimensional image,

a length of an imaging optical path for at least one of the colors being different from those of imaging 10 optical paths of the other two colors, so as to correct differences in magnifications in a direction corresponding to the first direction caused by color aberration.

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